



CHAPTER 1

COMPUTER SYSTEM

1. Computer System

1.1 Introduction

A computer system, the living world has a continuous need to communicate through some means known as Computer Peripherals or Input/Output Devices. Computer peripherals can be divided into three broad categories namely Input Devices, Output Devices and Input/output Devices.



Figure 1.1 Input/output Devices

1.2 Input Devices

1.2.1 Keyboard

The computer 'language' is most commonly used type device to enter numbers, alphabets and special characters into the computer. The keyboards are also used to type in the commands to direct the computer to perform various tasks. A keyboard has alphabetic and numeric keys for

1.1.3 Magnetic Ink Character Recognition (MICR)

Magnetic Ink Character Recognition Code (MICR Code) is a character recognition technology used mostly by the banking industry to ease the processing and clearance of cheques and other documents. It uses its three standard lines for understanding of computer.

1.1.4 Optical Mark Reader (OMR)

There are optical character reader and mark reader types. The type of reader depends on the type of marking. For example, Mark Recognition type is a device that is similar to the magnetic OMR, except that the device checks and produces result to output OMR in data and in average profile and form.

1.1.5 Optical Character Recognition (OCR)

Optical character recognition (optical character reader) (OCR) is the electronic equivalent of images of typed characters or printed text, which are scanned into a memory and then from all data entry from printed paper documents, whether printed documents, various kinds of documents, computer-generated business cards, or 1 picture of a document, or any suitable document. It is most common method of digitizing printed text so that it can be electronically stored, searched, copied, and reprinted, displayed on line, and used as input to processes such as machine translation, text-to-speech, and document analysis.

1.1.6 Bar Code Reader

The Codeless machine reads the data representation of an object and is used to input computer. Generally, barcode representation is by varying the width and spacing of parallel lines. But later they realized that rectangles, dots, triangles and other geometric patterns are also alternatives. There are specifically used for shipping labels and identification for goods, labeling and inventory management. A typical barcode scanner (bar code reader) consists of a computer terminal connected to the code and the scanner.

1.1.7 Speech Recognition Device (Microphone)

Microphone is an input device and the input mode device is a computer. It is connected to a computer system through a single wire and some may use a wiring that plugs into device to capture the audio.

1.1.8 Webcam/Web-Camera

This is a digital camera connected to the computer and can take images / videos to computer networks through the computer. The camera is focused on the input device to take a picture and convert it into a readable format for viewing in a computer system.

2.2 Output Devices

2.2.1 Monitor

There are several ways of output. The most popular is the **monitor**. It allows you to view what the computer is doing.

2.2.1.1 CRT Monitor

The standard output device of a personal computer has been the CRT monitor. It is, perhaps, a TV set. A CRT monitor contains a tube inside the tube that puts an electron beam of varying points in "x" or "y" position onto the inner glass plate. Monitor screens are measured diagonally across the screen, in inches. The resolution of the monitor or monitor screen of pixels is how many dots horizontally and vertically across the screen. The dots are called pixels. Pixels are the smallest dots that make the image displayed on the screen. The spacing of the screen's phosphor dots is called the dot pitch. A screen with smaller dot pitch produces sharper images.



Figure 2.1 CRT Monitor

2.2.1.2 Flat Panel Monitor



Figure 2.2 Flat Panel Monitor

A flat panel monitor usually uses an LCD (Liquid Crystal Display) panel to show images from the computer. The LCD is made of several thin layers that polarize the light entering through them. The polarization of one layer, containing tiny thin molecules, will reject light. Layers can be controlled electronically and will allow or block varying amounts of light to reach a panel light or reflect. LED (Light Emitting Diode) and Plasma Displays also use panel technology but LEDs are more popularly used in computers especially in laptops.

Flat panel displays are much lighter and less bulky than CRT monitors. The latest LCD screens are transparent from the monitor (BT) controlling each pixel, under picture quality and energy usage are much improved. LED monitors are light emitting diodes that run at a performance level in the monitor. The latest LED monitors are the LED monitors with a LED backlight to power up the LCD panel.

13.1.2 Printing

Screen printers deliver images as a permanent visible format also known as **hard-copy**. Usually output is printed on paper. The printed image quality is measured in terms of **DPI** (dots per inch). The printer may be classified broadly into **impact** and **non-impact** printers.

13.1.2.1 Impact Printers

13.1.2.1.1 Character Printer

This type of printer is called **dot-matrix** or **line** (also popularly known as **Dot Matrix** and **Dot or Wheel Printer**). Dot matrix printers are small electromechanically constructed units in the past, but are now almost entirely in plastic design by impact. These printers use a tiny and comparatively slow (10 cps) electromechanical system where continuous printing is to be done on 80 columns and 132 columns capacity.



Figure 1.10: Dot matrix printer

13.1.2.1.2 Line Printer

A line printer prints a complete line at a time. Traditionally, line printers were also referred to as **Character Printers** and **Column Printers**. These types of printers are generally slow-moving units in which an electromechanical mechanism is involved. It typically prints one character at a time on the paper while the paper and it is printed. They speed range from 200 to 3000 lines per minute (lpm) depending on type of printing operation.

13.1.2.1.3 High Impact Printers

High impact printers generally take less impact pressure as I said very quickly. They do not use a moving format to produce characters on the paper. Hence, if the printer uses impact printers are:

13.1.2.1.1 Inkjet Printers



Figure 1.11: Inkjet printer

The most common type of printer for home use is **inkjet** or **jet**. These printers print the image of the page by spraying small droplets of ink through nozzles. The printer uses a mechanism of ink to make color images. These printers are comparatively cheaper but the cost of consumables makes them suitable operation for long run.

13.1.2.1.2 Laser printer

A laser printer produces good quality images for office and business purposes. A laser printed with photo-realistic water color images, with fine or image is visible with a laser. The laser line with



Figure 1.12: Laser printer

through the main saddle where the top and bottom papers and the head and the paper web join.

Most laser printers are nonimpact (jet) color heads, only the drum exposure/toner pattern with multiple color laser toner/developer produces color color output. These printers are better than all jet printers that require a second or a paper/toner/developer.

2.2.2.1.3 Thermal Printer

Impactless thermal impact color/monochrome paper. The main reason is it is printing type by A4 (the most common paper in use). Printing cost is high and lower in long term for only professional color/monochrome paper.

2.2.2.1.4 Plotter

Plotters are used to print high quality vector graphics (engineering drawings, building plans, architectural drawings, etc.) onto the standard computer. They are not just a single color graphics (monochrome). They are generally from Plotter and Plot Plotter.

2.2.2.2 Scanner

- It is a part of the multimedia computer. Scanners convert analog data into digital for use in digital processing systems.

2.2.3 Multimedia Projector

Designed for projection output to a large screen display. Multimedia Projector is used for video and for displaying presentation slides (computer) during lecture meeting.

2.4 Input/Output Devices

Many peripheral devices have the capability of being used as input and output devices. Some of the popular Windows are listed below.

For monitor: The first monitor monitors a document into a series of lines and images (pictures) as a for image that can be manipulated like normal computer data. On the receiving side, a flat monitor converts the incoming data (images) to the same monitor (flat) on data and outputs the picture. That is a combination of input/output.

Multimedia Headset (MHR): It is a headset that produces a variety of sounds that would also be used as a separate peripheral device. It is a combination of peripheral devices (some from two of the following) a person, a headset, and a output. Examples of such device is a Multi-Function Printer.

Mouse: It is a device which is used to control the operation of the system (like a key) and

output which may be useful to (open for a) Computer. Similarly a maximum efficiency is measured from a computer system for different values.

These various displays and output devices are few other examples of various input/output devices.

QUICK REVIEW

- ▶ What are the various displays?
- ▶ What are various forms of output devices?
- ▶ What are various input/output devices?

KNOWLEDGE TIP

If you are getting an I/O error, it is less likely to be data in the computer system of your computer system error. If the same error occurs, then you have a problem with the drive. If you are told or told else with to access, then through that technology.

1.4 Computer Memory

A computer memory system is composed from it is used to store data and information. Computer memory is the storage space where data and instructions which are to be processed are kept. Memory is composed of three types: Cache Memory, Primary Memory (Main Memory) and Secondary Memory.

1.4.1 Cache Memory

Cache memory is a very high speed non-volatile memory which may speed up the CPU and the main memory. It is used to contain those parts of data and program which are used frequently used by the CPU. The parts of data and programs are transferred from disk to cache memory by operating system that when CPU use means them. The following are the advantages of cache memory:

- ▶ Cache memory is faster than the main memory.
- ▶ Transferring data is faster than the main memory.
- ▶ It is used for storing frequently used data.
- ▶ It is used for storing data that is not used often or a short period of time.

Types of computer storage



Figure 1.4 – Types of computer storage

There are some disadvantages of cache memory:

- ▶ Cache memory has limited capacity.
- ▶ It is expensive.

2.5.2 Primary Memory (Main Memory)

Primary memory holds only those data and instructions on which computer is working currently. The data in the memory is lost when the power is off. This memory is primarily made up of semiconductor devices. It stores organized arrays consisting of various fixed functions.

RAM (Random Access Memory) and ROM (Read Only Memory) are two examples of main memory. RAM is volatile memory. Examples of non-volatile memory are ROM, PROM (programmable), EPROM (erasable PROM) and flash memory. The data and instructions required to be processed reside in the main memory. RAM and ROM are two examples of main memory. ROM handles read-only data of main computer.

- ▶ It is the working memory of the computer.
- ▶ It is used to store the instructions.
- ▶ A computer cannot run without primary memory.

2.5.2.1 Random Access Memory (RAM)

The read/write (R/W) memory of computer is called computer memory. The data can read or write any information at that fixed location once it is reached after specifying the address of the location.

RAM is considered “random access” because memory access is memory cell. Firstly if we locate the address. The instruction undergoes the read and write storage cells which can read/remember an answer/choice. There are two types of RAM:

- Dynamic RAM (DRAM)
- Static RAM (SRAM)

The main reason behind the SRAM over DRAM is that SRAM is already pre-fabricated. SRAM is faster and more costly than DRAM. It is commonly used for CPU cache while DRAM resembles a long-term memory. Examples of RAM are:

- DRAM (connected from Output RAM) or DRAM RAM: any memory located will be accessed. It is used for high-speed data information activities.
- ROM (not dependent on RAMs): These RAM chips are the same as it exists in the CPU.



Fig. 2.5.2.1 RAM (Main Memory)

- **DDR SDRAM (Double Data Rate SDRAM):** The DDR memory has on both edges of module.

14.1.1 Read-Only Memory (ROM)

It stores information. The information stored in it is not lost even when power goes off. It is used for permanent storage of information. The information stored cannot be altered. However, it does not do by the manipulation of computer.



Figure 14.1 Read-only memory (ROM)

The following are the types of ROMs.

- **PROM (Programmable Read-Only Memory):** It consists of electrically erasable. The user can store the program. The device is not erasing PROMs program.
- **EPROM (Erasable Programmable ROM):** The stored information in EPROMs can be manually erasing. The EPROMs erase about 10 times. Typical power to erase part of it, but the entire contents can be erased. EPROMs are single-bit erasable.
- **Mask Memory:** It is an electrically erasable and programmable permanent type of memory. It uses fusible memory. all erasing at high probing energy. low power consumption, improved in high reliability. It is used in digital systems, ROMs, ROMs.

14.1.2 Secondary Memory



Figure 14.2 Secondary Memory (CD)

Secondary memory is a long-term external memory to store volatile memory. It is slower than the main memory. It is suitable for storing data and information permanently. CPU does not access secondary memory directly, either they are connected to the input/output system. Contents of secondary memory are then transferred to main memory or it then CPU can access it.

Characteristics of Secondary memory

- There are optical and magnetic memories (Optical/ Hard-Disk Memory).
- Data is permanently stored, even when the power is switched off (non-volatile memory).
- Slower than primary memory.
- Large and information can be stored.



Figure 14.1 Secondary Memory-Classification

where each one represents a 1 (Read Only).

2.8.3.1 HardDisk, HardDisk Drive



Figure 2.8.3.1 HardDisk

Hard disk storage is the used for storing and retrieving digital information using one or more flat rotating disks coated with magnetic material. The platters are partitioned magnetic tracks arranged in concentric arcs, which read and write information to the platter surface. Data is accessed in a random access manner that means the data can be accessed any instance. An HDD's primary is to store even when the power is off.

The primary characteristics of HDDs are its capacity and performance. A typical HDD with has a capacity of 1TBH (gigabyte) HDD where 1-GB = 2 billion bytes. Performance is specified by its characteristic to it to access the data i.e. Random rate.

2.8.3.2 Optical Disk

All optical disk drive similar shaped platters. There are no differences and storage capacity. The most popular optical disk capacity is 4.7GB (CD-R), 6.7GB (DVD-R) and 15GB (Blu-ray).

	Capacity	Layers	Read/Write	Accessible
CD-R	4.7GB/680MB	1	■	
CD-RW	4.7GB/680MB	1		■
DAC-RW	4.7GB	2		
DAC-R	4.7GB	2	■	
DAC-RW	4.7GB	2		■
DAC-R/R	4.7GB	2	■	

Figure 2.8.3.2 Comparison of Optical Disk

2.8.3.2.1 WORM Disk/CD Read-Write Disk

WORM stands for Write Once, Read Many. Disk is a Computer Disk Read-Write (CD-R). Large CD recording discs are also called this as WORM Disk/CD-R Disk only once. Data written disks are access by reading y magnetic disk surface by a magnetic beam for reading.

2.8.3.2.2 Compression Read/Write (CD-RW)

It is similar to WORM Disk because you can erase and rewrite the information multiple times.

15.3.3.3 Digital Versatile Discs (DVDs)

As an optical storage device, the DVD uses an CD-like storage capacity up to 4.7 GB (4.38 GB of data). DVDs may be clear, but no single-layer disks handle beyond 4.7 GB capacity until the next up-high quality transcoded and reflect.

15.3.3.4 Blu-Ray Disc

It is expected to replace existing DVD as the future. These discs offer up to 5 times more for recording with the additional capability to store high density data. With the storage capacity ranging from 15-100 GB (50-100).

USEFUL TIP

How to delete files on DVD-based discs given as a PC?

Open the Computer icon at given the Windows Windows Key + E in Computer, you will find each drive with a small yellow flag on it. Now, double click on it. From a list as well as a description of their capacity of free and the used disk space. If you want to delete information, right-click the disk drive available on the screen.

15.3.3.5 Fire Wire or FireWire Mass only

It is a small portable device which can be connected to a computer through USB Port. It can store data even when it is not connected to a computer. But very easy to implement and easy to use.

15.3.3.6 SmartMedia Card

It is a compactly designed for digital camera technology and it is especially suitable.

15.3.3.7 Removable Digital Card (RDC Card)

They are small portable Memory Card. Before the digital camera and present the data from integrated electronic camera.

- **SmartMedia Card** They is a card for meet the requirement among digital camcorders.
- **Memory Card** It is smaller than SmartMedia Memory card with all the features available in Smart Media.

QUICK REVIEW

- What computer uses as?
- Difference between RAM and ROM
- What secondary memory? What CD ROM is called?

2.4 Computer Classification

Computers may be classified based on their data processing capabilities. They are categorized according to purpose (data handling), hierarchical (size), and processing speed/performance.

2.4.1 Classification based on Operating Principles

According to operating principles and data handling, computers can be classified into following three categories: Analog, Digital and Hybrid Computers.



Figure 2.4 Classification of Computers

2.4.1.1 Analog Computers

Analog computers work under principles of measuring to which the computer can go with an analog with data. There are used to measure quantities like voltage, temperature, pressure etc. These computers do not operate as continuously.



Figure 2.4.1.1 Analog Computer

2.4.1.2 Digital Computers

Digital computers operate with information in the digital form. These computers operate with great accuracy and efficiency. These operate by counting. These computers are used for all general purpose applications and are used for electronic data processing work.



Figure 2.4.1.2 Digital Computer

2.4.1.3 Hybrid Computers

These computer utilize features of both Digital and Analog computers. A hybrid computer system may offer a cost effective method of performing complex operations. These computers serve as controller and provide input/output.

14.1 Classification based on Size, Storage Capacity and Performance

Computers are broadly put together in groups and are called a laptop or a mainframe or a mobile and embedded systems. The four basic types of computers are Super, Mainframe, Mini and Micro/Computer.

14.1.1 Super Computer

These are the most powerful computers in terms of processing, performance and system processing. These computers are known and computers used by govt. for huge scientific and scientific purposes. Like NASA is using these computers for handling space shuttle, modelling, forecast for space exploration purposes. These computers require lot of space for functioning and are extremely expensive. The first super computer was the product of Cray called C-90.

Applications of Super Computers

- **Weather Forecasting:** Super computers are used for predict and study weather forecasting and to analyze the current and future of weather conditions.
- **Manufacturing structure:** Super computers are used for exploring the manufacturing processes. These computers are used to explore the current gas, petroleum and coal.
- **Genetic studies:** These computers are also used in studying the connection between different genes, different without mutations, different individuals.



Figure 14.1 Super Computer

There are many other uses like super computers used for forecasting the impact of nuclear weapons. Some super computers are

- IBM's super computer
- Fujitsu's EC computer is super
- Cray's super computer is super

14.1.2 Mainframe Computers

These computers are also very expensive and are used by government organizations, large business firms and the financial institutions. These computers are kept in big rooms with appropriate cooling and other facilities. They can process a large volume of data at a very high speed. Big business firms, educational institutions and insurance companies use mainframe computers in their office networks.



Figure 1.18: Room-size Computer

Some popular room-size computers are:

- *Apple II, IBM*
- *Acorn RISC*

2.6.2.3: Mini-Computers

Mini-computers are used by comparatively small business houses, although they are not as powerful as super-computational machines; however, as well they occupy powerful machines that are used by big-size companies and production houses. These computers store a significant volume of data and large data. Some examples of these computers are:

- *IBM*
- *Texas Instruments (TI-990)*
- *IBM 16*

2.6.2.4: Micro-Computers

Desktop-computers, laptops, PDAs, MP3s and smart-phones are all types of micro-computers. These computers are widely used in individual and growing computers. These are designed amongst the all low-cost type computers. These computers are general-purpose computers widely used for education, entertainment and other office purposes.

QUICK QUIZ

- How do we classify computers based on speed, storage and performance?
- Difference between Personal-Computer and Super-Computer
- What is the reason of failure of super-Computer?

Multiple-Choice Questions

1. Every character is a type of:
 - a. Memory process
 - b. Input/output
 - c. Laser Printer
 - d. Manual
2. Which of the following statements could be related to any type of process?
 - a. Memory RAM
 - b. Operating RAM
 - c. CPU (CPU)
 - d. RAM
3. Which memory is used to store most frequently accessed information from the RAM?
 - a. Cache Memory
 - b. Main Memory
 - c. Register
 - d. ROM
4. An optical disk (combination and work presentation) is a presentation:
 - a. CD-ROM
 - b. Punched Card Reader
 - c. Magnetic Tape
 - d. Optical Scanner
5. Which type of memory is related to access?
 - a. RAM
 - b. ROM
 - c. PSRAM
 - d. EPROM
6. Which type of ROM can be used by an electrical signal?
 - a. ROM
 - b. Memory ROM
 - c. EPROM
 - d. EEPROM
7. Which of the following is a computer with computer data, more (play role provide)?
 - a. Display/printer
 - b. Low printer
 - c. Laser printer
 - d. Character printer
8. Which of the following printers has the quality best reproduction?
 - a. Laser printer
 - b. Inkjet printer
 - c. Vector
 - d. Dot-matrix printer
9. Which color printer is a printer?
 - a. Monitors
 - b. Monochrome
 - c. Workstations
 - d. Super Computer
10. Which type of printer?
 - a. Display/printer
 - b. Display/printer
 - c. Low printer/printer and more
 - d. All of them